Section 16 Planning Application for Proposed Minor Relaxation of Domestic Plot Ratio and Building Height Restrictions for the URA Kai Tak Road / Sa Po Road Development Scheme (KC-015)

Prepared by:
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Date:
May 2026
Rev.0

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1. Introduction

1.1 The Kai Tak Road / Sa Po Road Development Scheme (KC-015) (the Scheme), is located in Kowloon City and is bounded by Kai Tak Road, Prince Edward Road East, Sa Po Road, and Carpenter Road. The Development Scheme Plan was approved by Chief Executive in Council (CE in C) on 29 September 2020 (the Approved DSP).

1.2 With an aim to enhance development flexibility to meet market needs, adopt Modular Integrated Construction (MiC) method and aboveground carpark design in response to the recent Government initiatives, the URA intends to seek Town Planning Board (TPB)'s approval on **minor relaxation of domestic plot ratio (DPR) restriction from 7.5 to 8.0 and building height restrictions (BHR) from 120mPD to 140mPD for Application Site (i.e. the area zoned "R(A)" of the Approved DSP)** in accordance to Section 16 of the Town Planning Ordinance (S16 Planning Application).

1.3 This S16 Planning Application is a "non-scheme-based" submission. The notional design and indicative development parameters provided in the application are solely for illustration purpose and for conducting necessary technical assessments. Except for any planning condition(s) to be imposed, the design of the future development will not be bounded by the notional design submitted in the S16 Planning Application.

1.4 SYW & Associates Ltd. was commissioned by URA to conduct the Drainage Impact Assessment (DIA) to assess the potential drainage impact and to recommend mitigation measures as necessary in support of this S16 Planning Application.

1.5 This DIA report has taken into account (i) the DIA for Approved DSP dated 2019 (2019 DIA for Approved DSP) and (ii) the DIA for diversion works for Carlson Court and High Place dated 2025 (2025 DIA for Approved Diversion Works), which the Drainage Services Department (DSD) had no in-principle objection on the assessments and the proposal provided in these two reports.

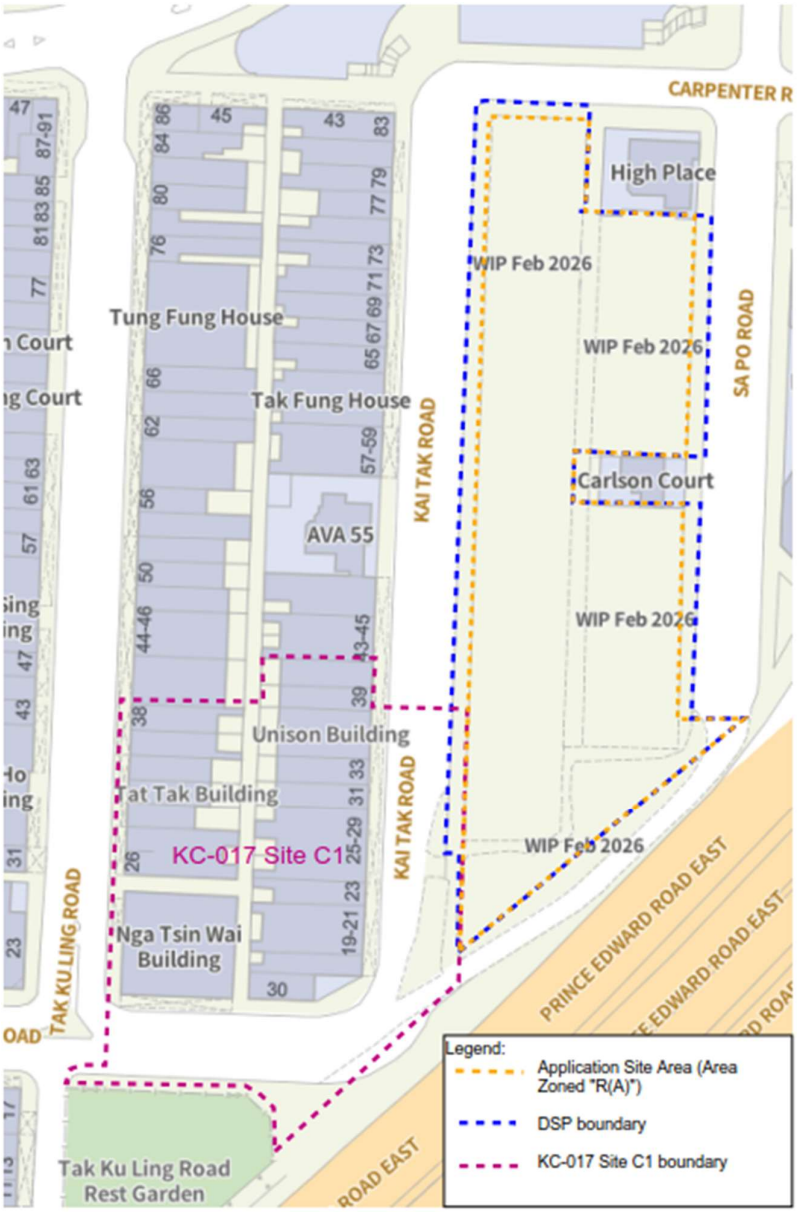


Figure 1 – Location Plan of the Site

2. The current S16 Planning Proposal

2.1 The Application Site, with an area of about 5,307sq.m., is broadly bounded by Carpenter Road to the north, Kai Tak Road to the west and Sa Po Road to the east. Please refer to Figure 1 for the location plan.

2.2 The S16 Planning Application seeks TPB permission for (i) minor relaxation of maximum permissible DPR from 7.5 to 8.0 and (ii) minor relaxation of BHR from 120mPD to 140mPD to enhance development flexibility to meet market needs and at the same time facilitate design flexibility for adopting MiC and aboveground carpark design to the Scheme in response to the recent Government initiatives.

2.3 A comparison table for the indicative parameters based on the notional design for the Approved DSP and the current S16 planning proposal is provided in **Table 2.1** below.

Table 2.1 Comparison of Indicative Development Parameters of the Approved DSP and the Current S16 Proposal

Development Parameters	Approved DSP [A]	Current S16 Proposal [B]	Difference [B]-[A] (% change)
Site Area			
- Application Site Area (for PR Calculation) (m^2)	About 5,352	About 5,307 (1)	-45 (-0.8%)
Maximum PR (3)			
- Total PR	9.0	9.0	No Change
- Domestic PR	7.5	8.0(2)	+0.5 (+6.7%)
Max GFA (3)			
Total GFA (m^2)	About 48,168	About 47,763(1)(2)	-405 (-0.8%)
Domestic GFA (m^2)	About 40,140	About 42,456(1)(3)	+2,316 (+5.8%)
Max. BH (mPD)	120	140	+20 (+16.7%)
GIC Facilities(4) (m^2)	About 800	About 800	No Change
Split-level Sunken Plaza (m^2)	About 1000	About 1000	No Change
Under Notional Design			
No. of Residential Towers	3 towers	2 towers	-1 (-33.3%)
No. of Storeys			
- Domestic	29 storeys	31 storeys	+2 (+6.9%)
- Clubhouse	1 storey	1 storey	No Change
- Podium	3 storeys	5 storeys	+2 (+66.7%)
- Basement	5 storeys	2 storeys	-3 (-60.0%)
Average Flat Size (m^2)	About 42.8(5)	About 42.8 (5)	No Change(5)
No. of Flats	About 938(5)	About 992(6)	+54 (+5.8%)(5)
Anticipated Population	About 2251 (5)	About 2480(8)	+229 (+10.2%)(5)

Remarks:
(1) As per the net site area under land grant resulting to corresponding adjustment in GFA.
(2) Excluding 10% of MiC floor area which could be disregarded from calculation of GFA and plot ratio as per Joint Practice Note No. 8.
(3) The domestic and non-domestic PR/GFA are for illustrative purpose only. To allow flexibility and optimum use of development potential, development at the Application Site is subject to a maximum

domestic PR and total PR. The actual domestic and non-domestic PRs and GFAs would be worked out at detailed design stage.

(4) GIC to be exempted from GFA calculation under the Approved DSP.

(5) For a like-to-like analysis, an average flat size of about 42.8sq.m. under the Current S16 Planning Proposal has been applied to both the approved DSP and current S16 scenarios in the comparison table to show the net increase in the number of flats and population. For reference, the notional design for the Approved DSP for KC-015 approved by CE in C in Sep 2020 had adopted an average flat size of about 49.6sq.m. with about 938 no. of flats and an estimated population of about 1940.

(6) The actual no. of flats would be worked out at detailed design stage.

(7) In lined with the notional design adopted for the Approved DSP, the estimated population is based on the average domestic household size in Lung Shing District Council Constituency Area is 2.5 persons.

(8) Based on Population Census 2021, the average domestic household size in Lung Shing District Council Constituency Area is 2.5 persons.

(9) Assumed in accordance with the First Schedule of Building (Planning) Regulation that for a Class C site with building height over 61m, the site coverage shall not exceed 40% for a domestic building or for the domestic part of a composite building, and shall not exceed 65% for a non-domestic building, or for the non-domestic part of a composite building. If the non-domestic podium does not exceed 15m in height, a site coverage of not more than 100% shall be permitted. The actual site coverage for the development at the Application Site will be determined at detailed design stage.

2.4 While the subject S16 Planning Application is a "non-scheme-based" submission, this DIA is prepared based on the indicative development parameters for S16 Planning Application (i.e. Column (B)) in **Table 2.1** above and the notional design provided in **APPENDIX A**, for the purpose of conducting technical assessments. The tentative completion year for the Scheme will be 2030/2031.

3. Existing and Planned Drainage Works

3.1 Existing Drainage Context

3.1.1 The current surface run-off from the Application Site area is collected by drains along the scavenging lane between the buildings within the Application Site boundary as shown in **Figure 2**, by pipe sections from manhole SMH4037349 and discharge southwards.

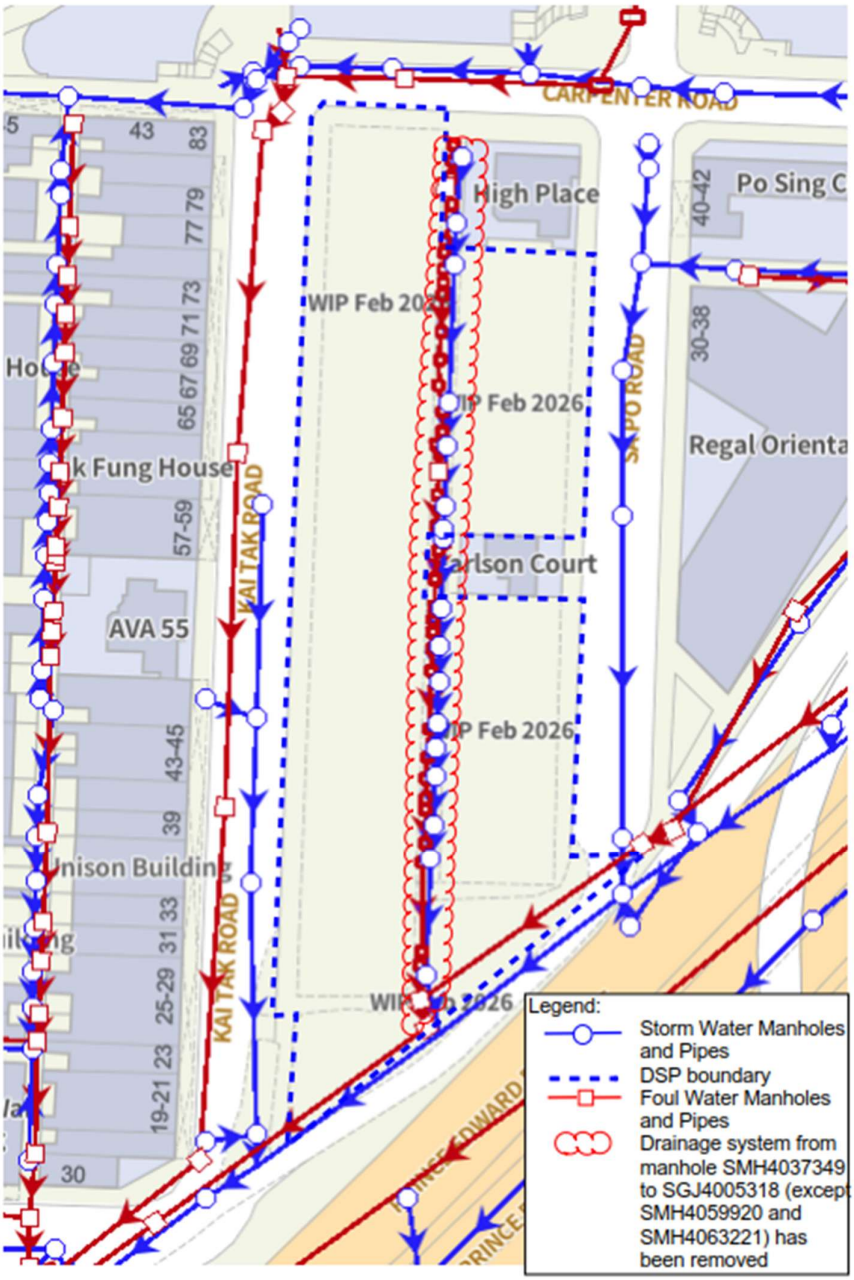


Figure 2 – Existing Drainage Network as shown in GeoInfo Map

3.2 Planned Drainage Context

3.2.1 The drainage proposals planned under in (2019 DIA for Approved DSP), is summarized as follows:

- Stormwater from High Place was proposed to be collected by public manhole SMH4037348 via a new 375mm dia. pipe, and 3 sections of surcharged pipes were proposed to be upgraded.
- Stormwater from Carlson Court was proposed to be collected by public manhole SMH4037321 via new 225mm dia. pipes; this proposed work has been completed.
- The stormwater runoff from the Application Site was proposed to be collected by a single manhole and discharge to the public drainage system via SGJ4005318.
- A portion of the public drainage pipe section (from manhole SMH4037328 to SMH4037342) under Sa Po Road is located within DSP boundary, temporary diversion during construction phase might be required if necessary.

3.2.2 A DIA had been approved for the diversion works for Carlson Court and High Place by DSD in 2025 (i.e. the 2025 DIA for Approved Diversion Works). Extracts from the report and acceptance letters can be found in **Appendix C**. Please note that the diversion works had already been completed as shown in **Figure 3**. The updates introduced to the 2019 DIA for Approved DSP by this 2025 DIA are listed below:

- The stormwater discharge from High Place was revised to discharge via Carpenter Road instead of Sa Po Road. The diversion work has now been completed.
- The proposed location of the terminal manhole has been revised and will be implemented in the detailed design stage.
- Upgrading of 3 sections of surcharged pipes along Sa Po Road is no longer required, as the discharge from High Place has been revised to discharge via Carpenter Road instead of Sa Po Road.

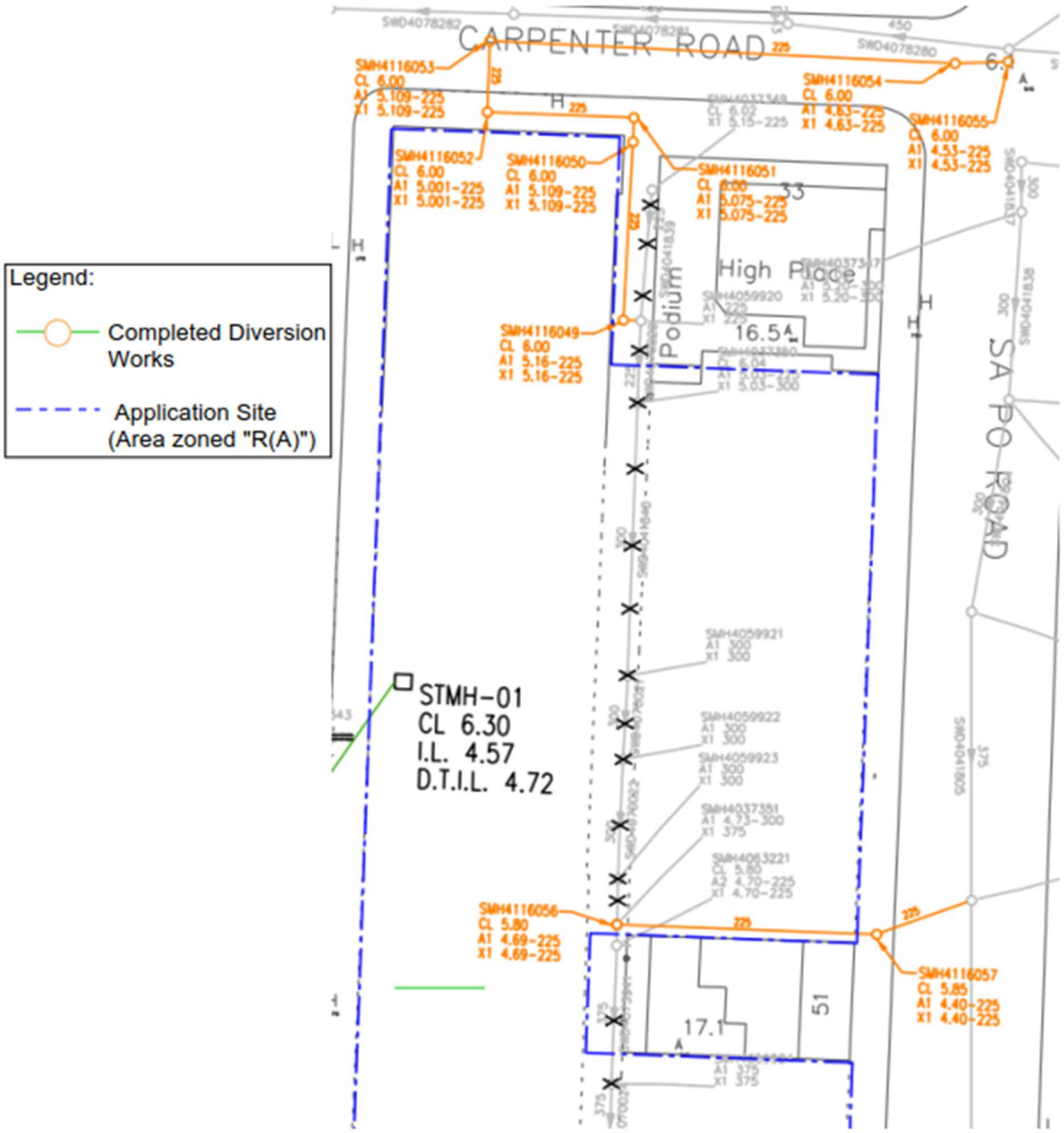


Figure 3 – Completed Diversion Works for Carlson Court and High Place

3.2.3 In addition, portion of Kai Tak Road and Nga Tsin Wai Road is planned to be realigned within the adjoining KC-017 Site C1 boundary as shown in Drawing 1. The corresponding drainage impact and indicative diversion within KC-017 Site C1 boundary provided in this report are solely for illustration purposes and for conducting necessary drainage impact assessment for the Current S16 Planning Proposal. Any proposals related to KC-017 Site C1 are subject to further study and detailed design.

4. Method of Analysis

The following information was reviewed for this DIA report:

1) Drainage Records as shown in GeoInfo Map from Hong Kong Government (https://www.map.gov.hk/gm/);
2) DSD Stormwater Drainage Manual, Fifth Edition, January 2018; and
3) DSD Stormwater Drainage Manual – Corrigendum No. 1/2022.

4.1 Project Interface

Another development project (KC-017 Site C1) by URA downstream of this site is proposed to be executed in the future, this coordination with KC-017 Site C1 has been carried out and the result is reflected in this DIA.

4.2 Assessment Criteria

Design Return Period

4.2.1 The design return period for the existing and proposed drainage system will be designed and assessed based on standards as set out in the Stormwater Drainage Manual (SDM) and Stormwater Drainage Manual – Corrigendum No. 1/2022, 1/2024 and 2/2024. Table 10 of the SDM recommended design return periods based on flood levels for the various drainage systems which is shown in **Table 4.1**.

Table 4.1 Recommended Design Return Periods based on Flood Levels

Type of Drainage System	Return Period
Urban Drainage Trunk System	200 years
Urban Drainage Branch System	50 years

4.2.2 Since the Site is located within an urban area, the proposed design return period will be reference to the "*Urban Drainage Branch System*". The definition of the system as per Section of SDM will be adopted in this Assessment Report. In particular, pipe size or the equivalent diameter in case of a box culvert less than 1.8m is considered as branch drain, while pipe or box culvert with an equivalent diameter equal of larger than 1.8m is considered as trunk drain.

4.2.3 According to the SDM, 50-year design return period is recommended for the design of urban drainage branch system and is adopted for the design of the proposed drainage works for the proposed re-developments.

Design Rainfall Data

4.2.4 The storm constants as stipulated in Table 3a of the SDM is adopted for estimating the design rainfall intensity since the proposed works is within the HKO Headquarters Rainfall Zone. The storm constants for 10-year and 50-year return period are shown in **Table 4.2**.

Table 4.2 Storm Constants for Different Return Periods of HKO Headquarters Return Period

Return Period T (years)	10	50
a	485.0	505.5
b	3.11	3.29
c	0.397	0.355

4.2.5 A 28.1% increase in rainfall for End of 21st Century as per Table 28 of SDM has been applied in design of the proposed drainage works.

Roughness

4.2.6 The roughness value for the proposed drainage works are referenced to the recommended roughness values (k_S) recommended in Table 14 of the SDM and the adopted value is shown in **Table 4.3** below.

Table 4.3

Material and Classification	**Value of k_s(mm)**
Concrete Pipe	**0.15**
PE Pipe	**0.006**

Rational Method

4.2.7 The Rational Method is adopted for estimating the peak flows based on the size, runoff coefficient of the sub-catchment and the intensity of the storm event. The design rainfall intensity is determined in accordance with the Intensity-Duration-Frequency (IDF) relationship as specified in Section 4.3.3 in the SDM. The fundamental formula of Rational Method is as follows:

$$Q = C\,i\,A$$

Where:

Q = Peak load (flow) (m^3/s)
C = Runoff coefficient (unit less)
i = Rainfall intensity (mm/hr)
A = Catchment area (m^2)

The formula of IDF relationship is as follows

$$i = \frac{a}{(t+b)^c}$$

Where:

i = Extreme mean intensity in mm/hr
t = Duration in minutes (td ≤ 240)
a, b, c = Storm constants given in Table 3 of SDM

Hydraulic capacity

4.2.8 The hydraulic capacity of the proposed drainpipe is controlled by its size, shape, gradient and friction resistance. In the hydraulic analysis, Colebrook-White Equation is used for the drainage pipes. The formula of Colebrook-While Equation is as follows:

$$\overline{V} = -\sqrt{32gRS_f}\log\left[\frac{k_s}{14.8R} + \frac{1.255\nu}{R\sqrt{32gRS_f}}\right]$$

Where:

V = Cross-sectional mean velocity (m/s)
R = Hydraulic radius (m)
Sf = Friction gradient (dimensionless)
ks = Surface roughness (m)
v = Kinematic viscosity (m^2/s)
g = Acceleration due to gravity (m/s^2)

4.2.9 Derived value from above Colebrook-White is used to determine the required pipe/channel size using the Discharge and Mean Velocity formula as follows:

$$Q = V \times A$$

Where:

Q = Rate of flow, m^3/s
A = Pipe cross-sectional area, m^2
V = Cross-sectional mean velocity, m/s

Time of concentration

4.2.10 Times of concentration for various types of catchments shall be calculated in accordance with the methodology specified in **Table 4.4**.

Table 4.4 Time of Concentration or Various Types of Catchments

Type of Catchment	Time of Concentration	Remarks
Urban Catchment	Time of entry (Assumed to be 5 mins)+Time of flow in pipe	Time of flow to be calculated using full bore velocity

Siltation

4.2.11 Siltation allowance is made for the deposition of sediment in stormwater channels and pipes in the design and assessment of proposed drains. For the permissible degradation between desilting cycles, the following principle is adopted to account for the effects to flow capacity due to materials deposited on the bed:

a) 5% reduction in flow area if the gradient is greater than 1 in 25; or
b) 10% reduction in flow area in other cases

Runoff Coefficient

4.2.12 Runoff coefficient value C = 0.9 and 0.3 are adopted for paved and unpaved areas respectively in both existing and post-development conditions.

Kinematic Viscosity

4.2.13 Kinematic viscosity of stormwater is assumed to be 1×10^{-6} m^2/s.

5. Drainage Impact Assessment

5.1 Existing Catchments and Surface Runoffs

5.1.1 The existing drainage catchments associated with the existing drainage networks of the Application Site are identified based on the existing storm drainage layout. **Appendix C** provides existing catchment area information.

Manhole No.	Downstream Pipe Diameter	Downstream Peak Flow (m^3/s)	Remaining Capacity
SMH4037343	375 mm	0.376	overload
SMH4037588	450mm	0.521	overload

Table 5.1 – Hydraulic Performance for Existing Pipe under 50 years return period and End of 21st Century Climate Change Condition

5.2 Connection From The Application Site

5.2.1 This chapter evaluates the drainage impact of the additional flow from the area zoned "R(A)" to the public drainage system along Kai Tak Road. The existing public drainage pipes downstream from manholes SMH4037343 will be evaluated.

5.2.2 The neighborhood catchment areas are shown in **Drawing No. CP-01** under **Appendix D** and the indicative plantation area for the Application Site is provided in **Appendix B**, and each catchment is summarized in **Table 5.2** below and presented in **Appendix D**.

Catchment Zone	Area (m^2)	Paved Ratio
C1	512	100%
C2	1920	100%
C3	3557	90%
C4	1340	90%
C5	408	100%
C6	272	90%
C7	407	100%
C8	1155	90%
C9	334	100%
C10	2393	90%
C11	8400	100%
C12	1209	90%

Table 5.2 Neighborhood Catchment Areas

5.2.3 According to the hydraulic performance discussed in Chapter 5, the collected surface runoff from the area zoned "R(A)" is proposed to discharge to manhole SMH4037343 at Kai Tak Road.

5.3 Existing Drainage Condition with the Development Surface Runoff

5.3.1 The estimated total peak runoff from the Current S16 Proposal is **0.376m^3/s** under 50 years storm with end of 21st century climate change condition.

5.3.2 The hydraulic performance of the pipe downstream of manhole SMH4037343 at Kai Tak Road is presented in **Appendix D**. The drainage impact from the additional flow from the Application Site will only impact the existing public drainage pipes downstream from manholes SMH4037343.

5.4 New Drainage from The Application Site

5.4.1 A new manhole STMH-01 is proposed serving as the connection point of terminal manhole of the Application Site. **Drawing 1** shows alignments and invert levels for the proposed drainage pipes along the new layout and surface levels of Kai Tak Road

5.4.2 The proposed drainage pipes would adopt PE pipe which follows the relevant BS EN standard, and its hydraulic performance is summarized in **Table 5.3**.

Manhole No.	Downstream Pipe Diameter	Downstream Peak Flow (m^3/s)	Remaining Capacity
STMH-01	450	0.376	14.5%
SMH4037343	450	0.376	29.2%
SMH4037588	600	0.521	26.8%
SMH102	600	0.559	8.2%
SMH4037344	600	0.580	43.9%
SMH201	600	0.693	33.2%
SMH202	750	0.886	37.8%
SMH203	1050	1.605	26.2%
SMH204	1050	1.605	36%
SMH205	1050	1.605	35.1%

Table 5.3 – Hydraulic Performance for Proposed Pipes under 50 years return period with End of 21st Century Climate Change Condition

5.4.3 According to the hydraulic calculation presented in **Appendix E**, it is observed that the existing pipe would not have sufficient capacity under end of 21st century climate change condition with additional discharge from the Application Site, hence, the downstream pipe from SMH4037343 is proposed to be upgraded to 450mm dia. and the pipe downstream of SMH4037588 is proposed to be upgraded to 600mm dia.

5.4.4 As the drainage pipe at the junction of Kai Tak Road and Nga Tsin Wai Road is assumed to be demolished due to the gateway square (by KC-017 Site C1), the downstream of drainage along new Kai Tak Road and existing Tak Ku Ling Road are further diverted toward south along the west of Tak Ku Ling Road Rest Garden. The pipe size is assumed to be 1050mm dia. pipe.

5.4.5 In view of the level of existing sewerage pipe, the proposed drainage between SMH4037360 and proposed SMH203 is proposed to be a twin 450mm dia. pipe to prevent clashing. Subject to detailed design and further study, the drainage manhole SMH4037360 is assumed to be reconstructed by KC-017 Site C1.

5.5 Assessment of The Drainage Impact

5.5.1 Since the catchment area are the same for the Approved DSP and the Current S16 Scenario, the impact on the existing drainage network is the same for both scenarios.

5.6 Proposed Mitigation Measures

5.6.1 As discussed in Chapter 5, 2nos. of existing pipes will have insufficient capacity to handle the end of 21st century climate change condition with additional discharge from the Application Site and are proposed to be upgraded. Please refer to **Table 5.4** for a summary of the proposed upgraded work by KC-015.

Manhole No.	S16 Scenario	
	Existing Downstream Pipe Diameter	Proposed Upgrade Downstream Pipe Diameter
SMH4037343	375 mm	450mm
SMH4037588	450mm	600mm

Table 5.4 Proposed Upgrading Works

6. Overall Conclusion

6.1 The stormwater surface runoff from the Current S16 Proposal will be decreased due to less impermeable area from the planned layout. The stormwater runoff is proposed to be collected by manhole and discharge to the public drainage system via SMH4037343.

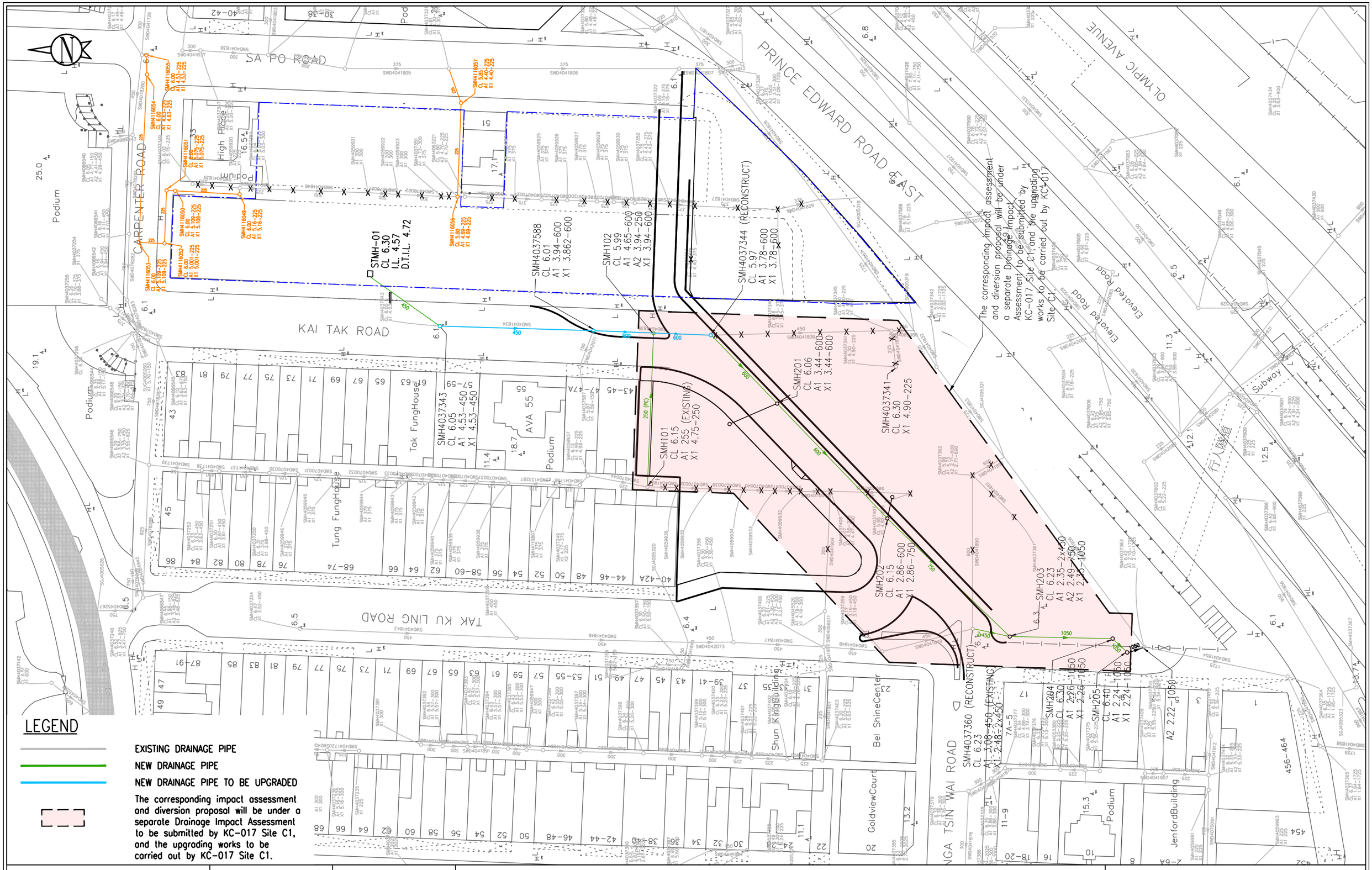
6.2 To cater for the Kai Tak Road realignment (by KC-017 Site C1), the existing drainage is assumed to be diverted and upgraded to suit the change in catchment characteristic by KC-017 Site C1.

6.3 Under the existing drainage network, 2nos. of existing pipes will have insufficient capacity to handle the end of 21st century climate change condition with additional discharge from the Application Site and hence proposed to be upgraded.

6.4 Since, the catchment area are the same for the Approved DSP and the Current S16 Scenario, the impact on the existing drainage network is the same for both scenarios.

6.5 The diversion and upgrading works by KC-017 Site C1 mentioned under this assessment are assumptions adopted for the DIA assessment for assessment purpose, it is not a proposal under this DIA and is subject to change and agreement with relevant Government Departments.

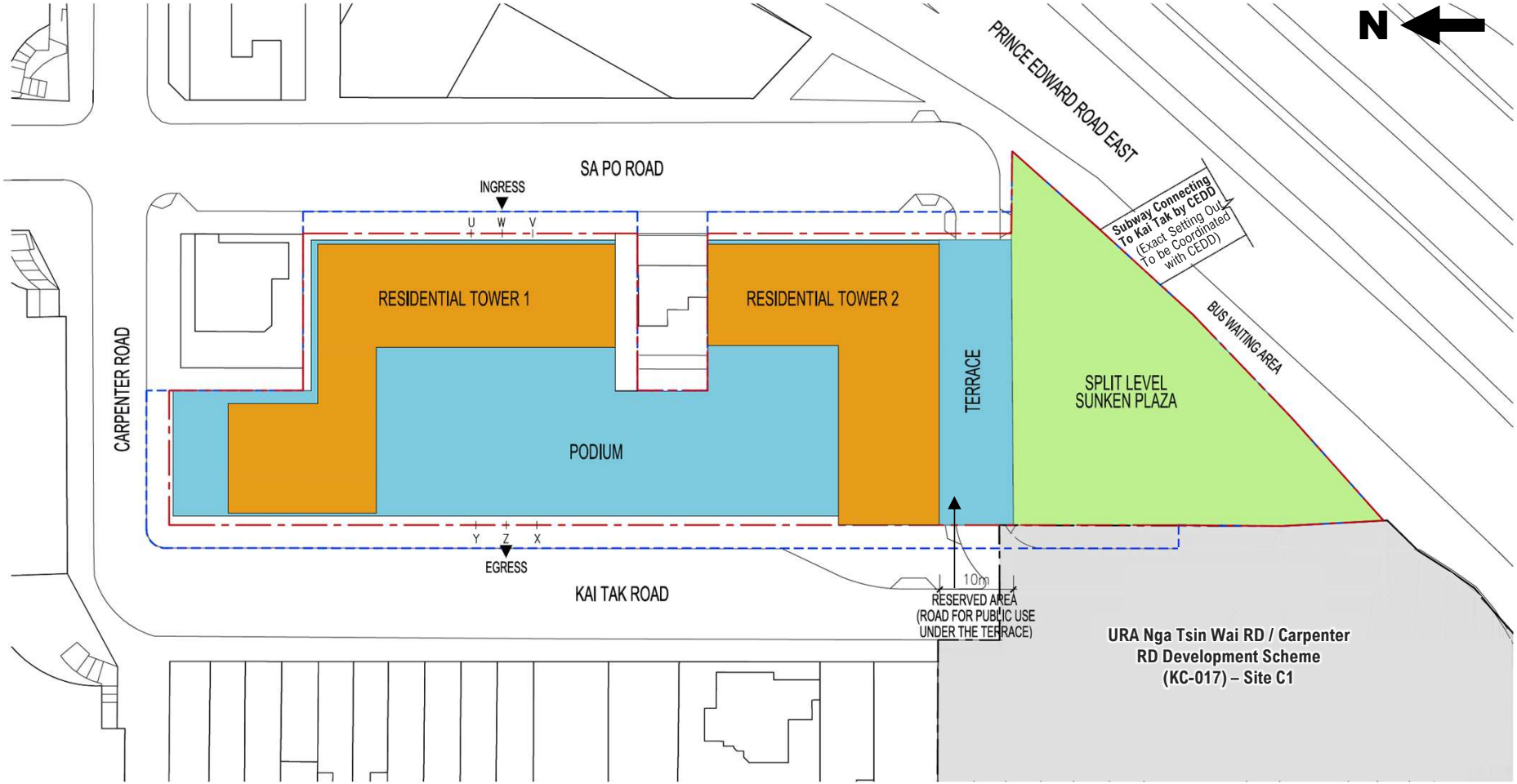
6.6 With mitigation measures (the downstream pipe from SMH4037343 is proposed to be upgraded to 450mm dia. and the pipe downstream of SMH4037588 is proposed to be upgraded to 600mm dia.; and the upgrading works / diversion works proposed to be carried out by KC-017 Site C1 as stated in para. 5.6.1), there is no adverse impact anticipated arising from the Current S16 Proposal.



JOB TITLE PROPOSED RESIDENTIAL DEVELOPMENT UNDER URA PROJECT KC-015 AT KAI TAK ROAD/ SA PO ROAD, KOWLOON CITY, KOWLOON	JOB NO. 724 DRAWN BY CHECKED BY APPROVED BY B.L.	DRAWING NO. 1 REVISION - SCALE DATE	DRAWING TITLE PROPOSED DRAINAGE UPGRADING WORKS	ENGINEER SYW & ASSOCIATES LTD. CHARTERED ENGINEERS & AUTHORIZED PERSONS 鄧貴偉建築工程師

Appendix A

Notional Design for the S16 Planning Proposal



NOT TO SCALE

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DSP Boundary

Application Site Area (Area Zoned "R(A)")

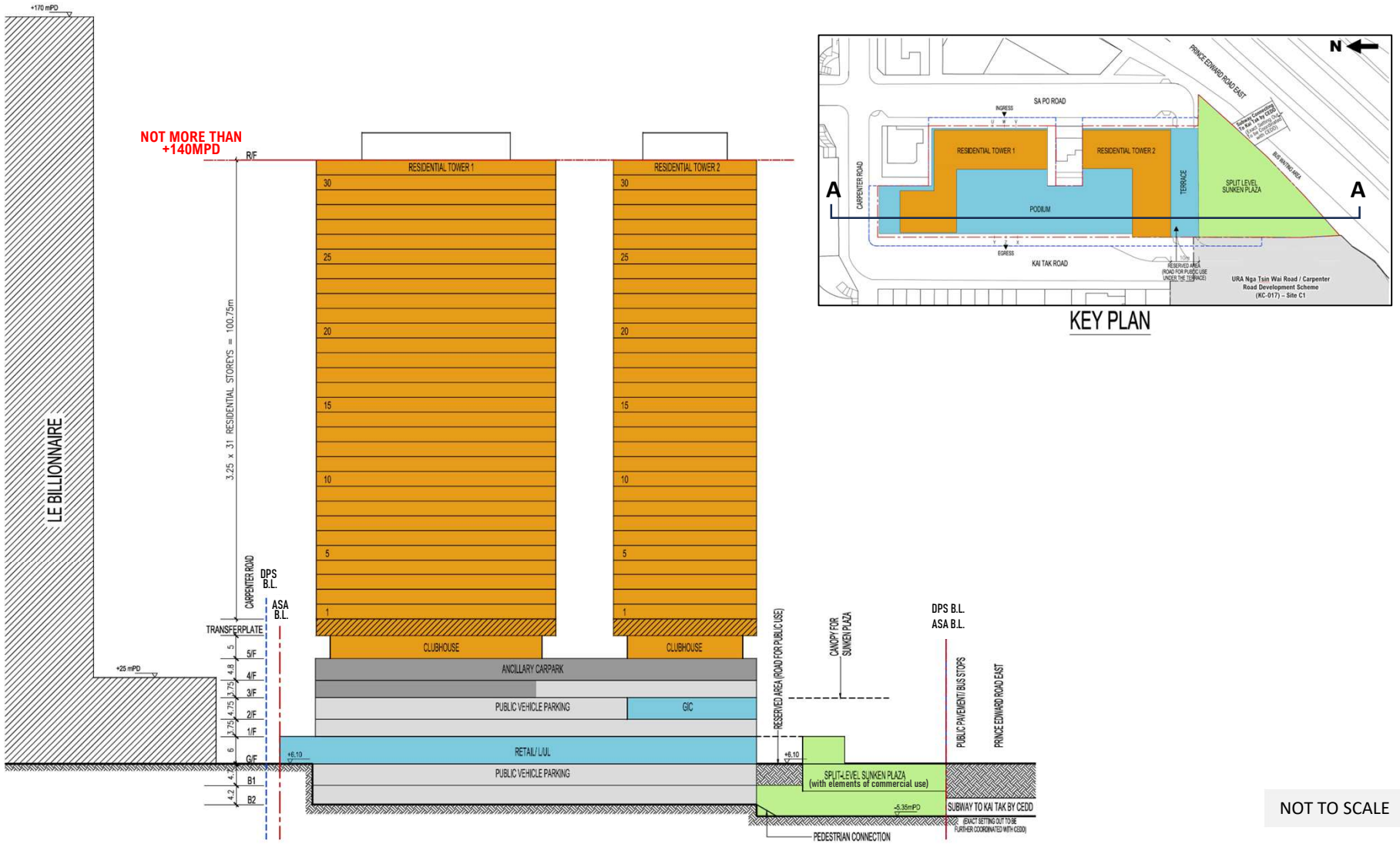
NOTIONAL BLOCK PLAN

URA KAI TAK ROAD / SA PO ROAD DEVELOPMENT SCHEME (KC-015)

VISUAL IMPACT ASSESSMENT

市區重建局 URBAN RENEWAL AUTHORITY

Figure 2.1



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DSP Boundary

Application Site Area
(Area Zoned "R(A)")

NOTIONAL SECTION PLAN

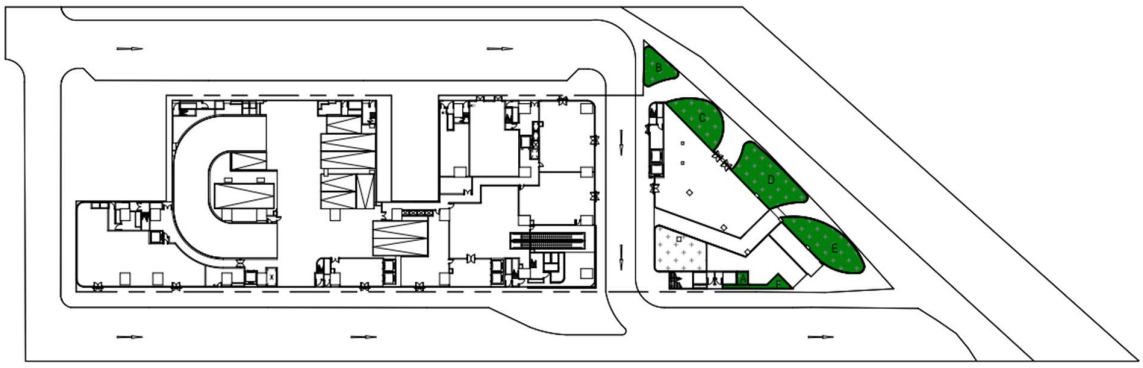
URA KAI TAK ROAD / SA PO ROAD DEVELOPMENT SCHEME (KC-015)
VISUAL IMPACT ASSESSMENT

市區重建局
URBAN RENEWAL AUTHORITY

Figure 2.2

Appendix B

Plantation Area Plan (for DIA assessment only)



Plantation Area Plan (for DIA assessment only)

GREENERY AREA AT G/F			
A	GREENERY AREA	=	5.333 s.m.
B	GREENERY AREA	=	33.040 s.m.
C	GREENERY AREA	=	65.028 s.m.
D	GREENERY AREA	=	100.768 s.m.
E	GREENERY AREA	=	93.319 s.m.
F	GREENERY AREA	=	13.328 s.m.
	TOTAL	=	310.816 s.m.

Appendix C

Extracts from Approved Drainage Impact Assessment Report (Oct 2025)

Drainage Services Department
Mainland South Division
14/F, Kowloon Government Offices,
405 Nathan Road, Kowloon

渠務署
九龍及新界南渠務部
九龍彌敦道 405 號
九龍政府合署 14 樓

本署檔號 Our Ref : (019V84) in MS 10/NKIL/484/0/Main Part 1
來函檔號 Your Ref : WC12831/CS24005/DSD/dk/eh
電話 Telephone : (852) 2700 1581
圖文傳真 Fax : (852) 2771 9640

By POST and Fax (2688 7288)

10 April 2025

Wilson & Associates Ltd
1608-09, Nan Fung Commercial Centre
19 Lam Lok Street
Kowloon Bay, Hong Kong
(Attn.:Mr Dixon KAM)

Dear Sir,

Re: Amendment submission for Drainage Impact Assessment Report
Sewer Water and Stormwater Diversion
between Kai Tak Road and Sa Po Road adjoining
NKIL Lot 1110 RP, 484 RP, 1105 SB RP, 1105 RP, 1433 RP & 1741 RP

I refer to your above letter dated 7 January 2025 regarding the submitted DIA report for the captioned works, I have no further comment.

Yours faithfully,

([redacted])
for Chief Engineer/Mainland South
Drainage Services Department

CC
E/K3, E/FR2, IOW/K3, AIOW/K3 – internal by EIMS

Utility Diversion Works for Carlson Court & High Place, Kowloon City, Kowloon

DRAINAGE IMPACT ASSESSMENT REPORT

Wilson & Associates Ltd.

3 DRAINAGE DIVERSION

3.1 As mentioned in **Section 2.3**, the drainage connection from Carlson Court and High Place to the public drainage system will be influenced by the removal of the pipes along the existing scavenging lane. The closest manhole to Carson Court is SMH4037321; and the closest manholes to High Place are SMH4037346 and SMJ4066541. The downstream of these manholes will be assessed in the following sections for a suitable diversion proposal.

High Place

3.2 The drainage discharge from High Place is currently collected by manhole SMH4059920 and flow southwards to downstream. Total drainage discharge from rooftop and podium of High Place is 20.4L/s.

3.3 The closest manholes for diversion are SMH4037242, SMH4066540 and SMH4066541 on Carpenter Road to the North of High Place and SMH4037346 on Sa Po Street to the East. The public drainage system surrounding High Place is shown in **Figure 3.1**.

3.4 For the option of discharging drainage from High Place to the public drainage system via SMH4066541, there is a 1050mm diameter wide sewer which runs parallel with the drainage pipes along Carpenter Road, the sewer have a invert level of approximately 3.70mPD, and the invert level at SMH4066540 approximately 4.30mPD, which means that it is impracticable to build a pipe from High Place to the drainage manhole SMH4066541 across Carpenter Road.

3.5 For the option of discharging via SMH4037346, due to the outgoing pipe invert level of SMH4037346 (5.35mPD) and SMH4037347 (5.20mPD) are higher than SMH4059920 (~5.1mPD), gravity pipe cannot be constructed or a drain pump is necessary for the stormwater to flow upward against gravity.

3.6 Therefore, the downstream is proposed to be connected to SMH4037242 as minimal work is required for this diversion as shown in **Figure 3.2**.

3.7 The total catchment including High Place and the service lane between High Place and the DSP boundary contribute 22.0L/s drainage discharge to the public drainage system. **Table 3.1** below summarizes the flowrate of the catchment; the detailed calculation is presented in **Appendix I**.

Table 3.1 Stormwater Runoff from High Place Catchment

Assessment Area	Total Area (m^2)	Paved Ratio	Surface Runoff, Q (L/s)
High Place (including rooftop, podium and lane)	420	100%	22.0
Total			**22.0**

The surface runoff is calculated with reference to DSD Stormwater Drainage Manual, Fifth Edition, January, corrigendum no. 1/2022 and corrigendum no. 1/2024

3.8 The total drainage discharge is proposed to be collected by a 250mm outer diameter PE pipe, the hydraulic parameters and capacity are listed in **Table 3.2** below and the calculation is detailed in **Appendix I**.

Table 3.2 Proposed Drainage Pipes from High Place Catchment

Manhole	Upstream Invert Level	Downstream Invert Level	Diameter (mm)	Full Capacity (L/s)
SMHA01	5.19	5.16	250 (OD)	43.3
SMHA02	5.16	5.109	250 (OD)	51.1
SMHA02-1	5.109	5.075	250 (OD)	44.6
SMHA02-2	5.075	5.020	250 (OD)	41.5
SMHA03	5.020	5.001	250 (OD)	79.5
SMHA04	5.001	4.63	250 (OD)	47.9
SMHA05	4.63	4.53	250 (OD)	52.9

Note: 10% reduction of flow area is allowed for effect of deposition of sediment

Carlson Court

3.9 The drainage discharge from Carlson Court is currently collected by manhole SMH4063221 at the service lane and discharge southwards. Total drainage discharge from rooftop and podium of Carlson Court is 17.0L/s.

3.10 According to the planned layout (**Figure 2.1**), there will be a new 3m wide lane for pedestrian use surrounding Carlson Court. As the manhole SMH4063221 is not disturbed, it is proposed that the drainage discharge from the building to be collected by the same manhole as existing setting and connect to SMH4037321 on Sa Po Road as shown in **Figure 3.3**. However, the sewage flow direction would be changed if the diversion proposal is adopted, the connected pipes will be demolished and rebuilt; and the manhole may also need to be rebuilt, but the location and connection to Carlson Court would remain the same.

3.11 The total catchment including Carlson Court and the service lane contribute 17.0L/s drainage discharge to the public drainage system. **Table 3.3** below summarizes the flowrate of the catchment; the detailed calculation is presented in **Appendix II**.

Table 3.3 Stormwater Runoff from Carlson Court Catchment

Assessment Area	Total Area (m^2)	Paved Ratio	Surface Runoff, Q (L/s)
Carlson Court – (including rooftop, podium and lane)	327	100%	17.0
Total			**17.0**

The surface runoff is calculated with reference to DSD Stormwater Drainage Manual, Fifth Edition, January, corrigendum no. 1/2022 and corrigendum no. 1/2024

3.12 The total drainage discharge is proposed to be collected by a 225mm dia. pipe, the hydraulic parameters and capacity are listed in **Table 3.4** below and the calculation is detailed in **Appendix II**.

Table 3.4 Proposed Drainage Pipes from High Place Catchment

Upstream manhole	Downstream manhole	Upstream Invert Level	Downstream Invert Level	Diameter (mm)	Full Capacity (L/s)
SMH4063221	SMHB01	4.70	4.67	225	76.1
SMHB01	SMHB02	4.67	4.37	225	63.5
SMHB02	SMH4037321	4.37	4.30	225	63.5

Note: 10% reduction of flow area is allowed for effect of deposition of sediment

4 DRAINAGE IMPACT ASSESSMENT

4.1 This chapter evaluates the drainage impact of the diverted drainage from High Place and Carlson Court to the public drainage system along Sa Po Road due to the redevelopment. The existing public drainage pipes from manholes SMH4037348 to SMH4037342 will be evaluated.

4.2 "Stormwater Drainage Manual – Planning, Design and Management", fourth edition, May 2013, (hereafter called "the DSD Manual") prepared by the DSD provides guidelines for the design of the drainage system. According to Table 10 of the DSD Manual, the recommended design return period based on flood levels is 50 years ("main rural catchment drainage channels") for conservative purpose.

4.3 The neighborhood catchment areas are shown in **Figure 4.1** and the area ratio of each catchment is summarized in **Table 4.1** below and presented in **Appendix III**.

Table 4.1 Neighborhood Catchment Areas

Catchment Zone	Area (m^2)	Paved Ratio
A (Po Sing Court with Service Lane)	1509	100%
B (High Place) and Service Lane	420	100%
C (Sa Po Road upstream of Carlson Court Outlet)	684	100%
D (Carlson Court and Service Lane)	327	100%
E (Sa Po Road downstream of Carlson Court Outlet)	934	100%
F (Carpenter Road upstream of High Place)	1840	100%
G (Carpenter Road downstream of High Place)	403	100%
H (Regal Oriental Hotel)*	1108	100%

*Portion of catchment (approximate 1/3 of the area shown on table) in Regal Oriental Hotel is discharged into the concerned drainage system

4.4 The hydraulic calculation of the maximum flow capacities of the existing public network is shown in **Table 4.2**. The detailed calculation can be found in **Appendix III**.

Table 4.2 Existing Public Drainage Pipe Capacity

Pipe No.	Outlet from	From Manhole	To Manhole	Diameter	Full Capacity
Pipe01	High Place	SMH4037242	SMH4066540	450mm	257L/s
Pipe02	High Place	SMH4066540	SMH4066541	450mm	355L/s
Pipe03	Carlson Court	SMH4037320	SMH4037321	375mm	245L/s
Pipe04	Carlson Court	SMH4037321	SMH4037322	375mm	155L/s
Pipe05	Carlson Court	SMH4037322	SMH4037327	375mm	322L/s

Note: 10% reduction of flow area is allowed for effect of deposition of sediment

4.5 The existing drainage system is evaluated with the catchment zones listed in **Table 4.1**, together with the catchment of High Place and Carlson Court. **Table 4.3** shows the stormwater discharge from catchment zones to each section of public drain and **Figure 4.2** shows the locations of the various downstream pipes.

Table 4.3 Stormwater Discharge

Downstream pipe	Pipe Capacity	Catchment	Total Discharge	Utilization
Pipe01	257 L/s	B (High Place) & F	126 L/s	49%
Pipe02	355 L/s	B (High Place) & F & G	126 L/s	36%
Pipe04	155L/s	A & C & D (Carlson Court) & H	151 L/s	98%
Pipe05	322L/s	A & C & D (Carlson Court) & E & H	245 L/s	76%

4.6 Impact of downstream of SGJ4005318

Based on the development as discussed, no discharge is considered connecting to SGJ4005318 from the service lane between Kai Tak Road and Sa Po Road. No impact is imposed to the connection SGJ4005318.

Meanwhile, the total catchment reserved for downstream of SGJ4005318 is reduced in this scheme (particularly due to the reduction of discharge from the demolished development and High Place). Therefore, no adverse impact is imposed on the drainage system concerned.

4.7 Drainage flow justification

The proposed public drainage pipe connecting to the public manhole reserves one source of building outlet. The flow angle is checked so that the design turning angle shall be less than 90 degrees. The corresponding drainage flow is presented in Figure **3.2** and **3.3**.

5 CONCLUSION

5.1 The stormwater surface runoff from the site will be decreased due to less impermeable area from the planned layout. Hence, no expected drainage impact is anticipated from this Scheme. The stormwater runoff is proposed to be collected by manhole and discharge to the public drainage system via SMH4037242 and SMH4037321 as the existing setting.

5.2 A portion of the public drainage pipe section (from manhole SMH4037328 to SMH4037342) under Sa Po Road is located within DSP boundary, temporary diversion during construction phase might be required if necessary. However, no disturbance to the public drainage service is expected and the pipes would be restored within site after construction phase.

5.3 However, due to the redevelopment, drainage pipe sections from manhole SMH4037349 to SGJ4005318 (except SMH4059920 and SMH4063221) within the DSP boundary will be removed; diversion of drainage system for High Place and Carlson Court is proposed.

5.4 The stormwater from High Place is proposed to be collected by public manhole SMH4037242 via new 225mm dia. pipes; and stormwater from Carlson Court is proposed to be collected by public manhole SMH4037321 via new 225mm dia. pipes.

5.5 The public pipe sections from SMH4037348 to SMH4037342 along Sa Po Road are evaluated. All drainage pipes have sufficient capacity to cater the drainage discharge from High Place, Carlson Court and the proposed development

N

SMH4059923
(to be abandoned)

SMHB01

SMH4063221

Pipe E

Carlson Court Outlet

SMH4001947
(to be abandoned)

SMH4037320

SMH4037321

SMHB02

Pipe F

Pipe 3

富豪東方酒店
Regal Oriental Hotel

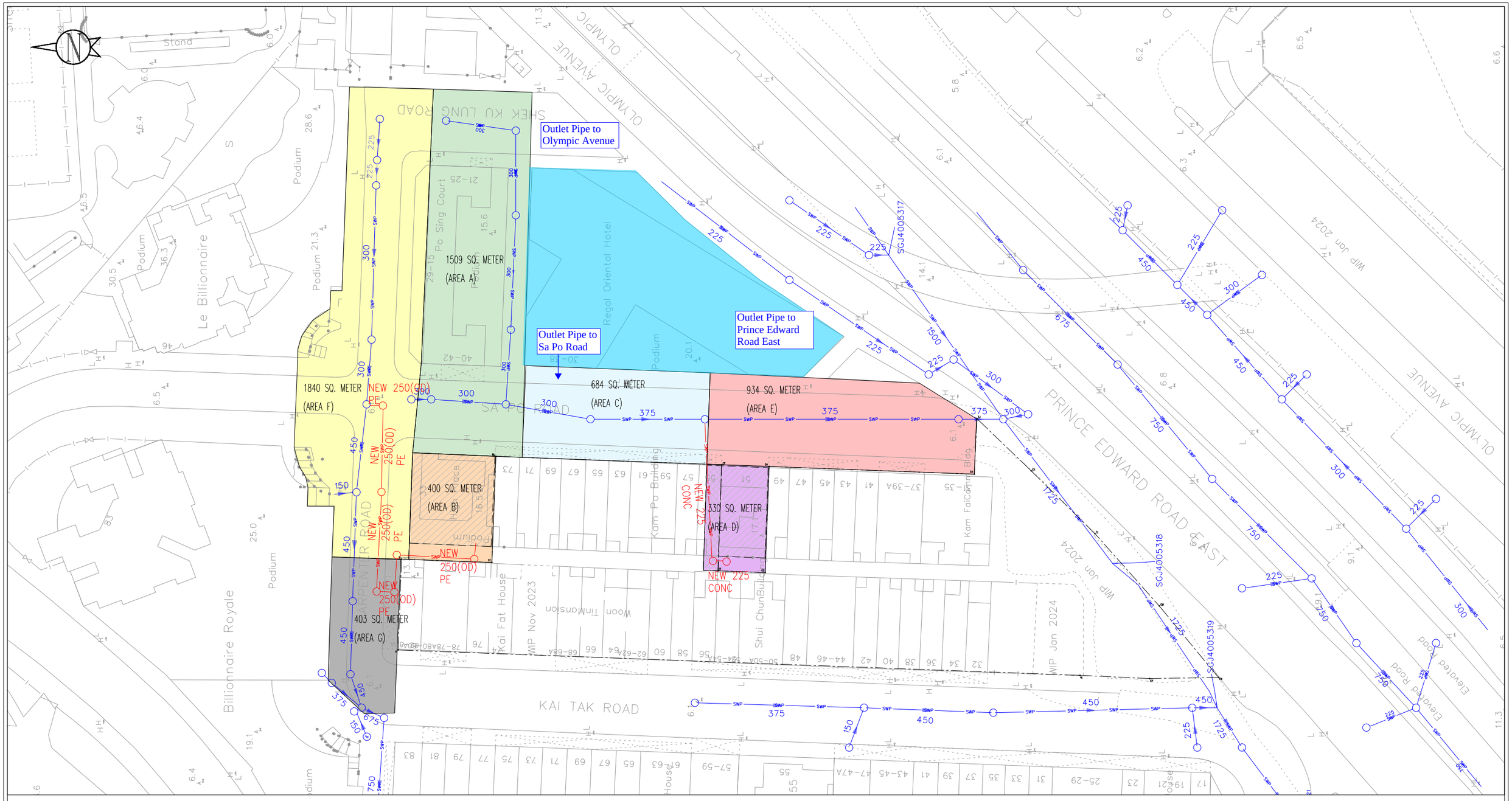
Legend

- Net SIte Boundary
- Proposed Drain
- Existing Public Drain
- Service Lane of Carlson Court
- Carlson Court

Drainage Impact Assessment
Kai Tak Road / Sa Po Road Development Scheme (KC015)

Proposed Drainage Diversion for Carlson Court

SCALE	1:250 @ A3	DATE	Feb 2019
CHECK	KW	DRAWN	JM
JOB No.	IA17019/KC015	DRAWING No.	3.3
		REV	A



LEGEND

- SITE BOUNDARY LINE
- AREA A
- AREA B
- AREA C
- AREA D
- AREA E
- AREA F
- AREA G
- AREA H
- SWP — EXISTING STORM WATER PIPES WITH MAN HOLE
- SWP — PROPOSED STORM WATER PIPES WITH MANHOLE

NOTE: ABANDONED STORMWATER PIPE WITHIN SERVICE LANE IS OMITTED IN THIS PLAN FOR EASE REFERENCE. THE ABANDONED MANHOLES AND PIPES REFER TO FIGURE 3.2 AND 3.3

ENGINEER: Wilson & Associates Ltd 張耀新建築工程師有限公司	JOB TITLE: PROPOSED UTILITIES DIVERSION SCHEME FOR CALSON COURT AND HIGH PLACE AT KOWLOON CITY	FIGURE TITLE: CATCHMENTS AREA	JOB NO. CS24005 / DRAWN T.K. / FIGURE NUMBER 4.1
			DATE APR.2024 / CHECKED D.K.
			SCALE 1:750 (A3) / APPROVED W.C. / REVISION –

APPENDIX I

CALCULATION

Reference

DSD Stormwater Drainage Manual, Fifth Edition, January 2018, corrigendum no. 1/2022 and corrigendum no. 1/2024

A.) Design Criteria

Storm Constant - HK Observatory

	50 Years
a	505.5
b	3.29
c	0.355

Runoff Coefficent

Surface Material	Coefficient
Paved Area	0.8
Unpaved Area	0.18

Minimum Time of Concentration

Surface Material	Time (min)
Paved Area	3
Unpaved Area	5

B.) Estimation of Peak Runoff for Each Catchment

																50 Years Rainstrom	
Catchment Area	Catchment ID	Total Area (m^2)	Unpaved Area (m^2)	Runoff Coefficient, C	Paved Area (m^2)	Runoff Coefficient, C	Flow Length (m)	Highest Level (mPD)	Outlet Level (mPD)	Average Slope (m/m)	Permeable Area	Impermeable Area	Time of Inlet (min), t_o	Time of Flow (min), t_f	Time of Concentration (min), t_c	Rainfall Intensity (mm/hr)	Peak Runoff (m^3/s)
A (Po Sing Court with Service Lane)	A	1509	0.0	0.18	1509	0.80	48	-	-	0.010	-	5.0	5.0	0.0	5.0	238.6	0.080
B (High Place) and Service Lane	B	420	0.0	0.18	420	0.80	30	-	-	0.010	-	5.0	5.0	0.0	5.0	238.6	0.022
C (Sa Po Road upstream of Carlson Court Outlet)	C	684	0.0	0.18	684	0.80	37	-	-	0.010	-	5.0	5.0	0.0	5.0	238.6	0.036
D (Carlson Court and Service Lane)	D	327	0.0	0.18	327	0.80	28	-	-	0.010	-	5.0	5.0	0.0	5.0	238.6	0.017
E (Sa Po Road downstream of Carlson Court Outlet)	E	934	0.0	0.18	934	0.80	55	-	-	0.010	-	5.0	5.0	0.0	5.0	238.6	0.050
F (Carpenter Road upstream of High Place)	F	1840	0.0	0.18	1840	0.80	75	-	-	0.010	-	5.1	5.1	0.0	5.1	237.4	0.097
G (Carpenter Road downstream of High Place)	G	403	0.0	0.18	403	0.80	50	-	-	0.010	-	5.0	5.0	0.0	5.0	238.6	0.021
H (Regal Oriental Hotel)	H	369	0.0	0.18	369	0.80	100	-	-	0.010	-	8.0	8.0	0.0	8.0	213.7	0.018

Design Pipe Capacity

Reference
1.) Colebrook-White's equation is adopted for full-bore pipe velocity calculation
2.) The partial velocity is obtained from the book:- *Tables for the hydraulic deisgn of pipes and sewers, Hydraulics Research* , Wallingford.

(note 1)

Drainge Pipe	Pipe	Diameter (mm)	U/S invert (mPD)	D/S invert (mPD)	Pipe Length (m)	Gradient (1 in)	Roughness Ks (m)	Design Peak Flow from (m^3/s)	Catchment	Design Peak Flow for Each Pipe (m^3/s)	Catchment	Full Bore Velocity,Vc (m/s)	Full bore Capacity,Qc (m^3/s)	Proportional Capacity Q/Qc	Proportional depth d/D	Coefficient for part-full pipe	Proportional Velocity V/Vc	Partial Velocity, V (m/s)	***Pipe Capacity Check***
Drainage Design (from High Place)																			
SMH4059920 to SMHA01		225	5.250	5.16	1.3	14	0.006	0.0290	B	0.0290	B	5.045	**0.1805**	0.16	0.27	330	0.73	3.70	***OK***
SMHA01 to SMHA02	A	220	5.160	5.109	9.2	180	0.006	0.0000	-	0.0290	B	1.266	**0.0433**	0.67	0.60	140	1.07	1.36	***OK***
SMHA02 to SMHA02-1	B	220	5.109	5.075	4.6	133	0.006	0.0000	-	0.0290	B	1.493	**0.0511**	0.57	0.54	154	1.03	1.54	***OK***
SMHA02-1 to SMHA02-2	C	220	5.075	5.020	9.3	171	0.006	0.0000	-	0.0290	B	1.305	**0.0446**	0.65	0.59	142	1.06	1.39	***OK***
SMHA02-2 to SMHA03	D	220	5.020	5.001	3.7	195	0.006	0.0000	-	0.0290	B	1.214	**0.0415**	0.70	0.62	136	1.08	1.31	***OK***
SMHA03 to SMHA04	E	220	5.001	4.630	22.0	59	0.006	0.0000	-	0.0290	B	2.322	**0.0795**	0.36	0.42	202	0.92	2.14	***OK***
SMHA04 to SMHA05	F	220	4.630	4.530	15.0	150	0.006	0.0000	-	0.0290	B	1.400	**0.0479**	0.61	0.56	148	1.05	1.46	***OK***
SMHA05 to SMH4037242	G	220	4.53	4.490	5.0	125	0.006	0.0000	-	0.0290	B	1.547	**0.0529**	0.55	0.53	158	1.02	1.58	***OK***
SMH4037242 to SMH4066540	1	450	4.49	4.410	17.7	221	0.006	0.0972	F	0.1262	B+F	1.798	**0.2574**	0.49	0.49	267	0.99	1.79	***OK***
SMH4066540 to SMH4066541	2	450	4.29	4.110	22.0	122	0.006	0.0000	-	0.1262	B + F	2.480	**0.3550**	0.36	0.41	325	0.91	2.27	***OK***
Drainage Design (from Carlson Court)																			
SMH4063221 to SMHB01		225	4.70	4.64	3.0	50	0.006	0.0174	D	0.0174	D	2.585	**0.0925**	0.19	0.29	219	0.77	1.98	***OK***
SMHB01 to SMHB02	E	225	4.64	4.40	23.9	100	0.006	0.0000	-	0.0174	D	1.777	**0.0636**	0.27	0.36	174	0.85	1.51	***OK***
SMHB02 to SMH4037321	F	225	4.40	4.30	10.0	100	0.006	0.0000	-	0.0174	D	1.773	**0.0635**	0.27	0.36	174	0.85	1.51	***OK***
SMH4037220 to SMH4037321	3	375	4.70	4.68	2.0	100	0.006	0.1339	A + C + H	0.1339	A + C + H	2.462	**0.2447**	0.55	0.53	290	1.02	2.51	***OK***
SMH4037321 to SMH4037322	4	375	4.30	4.15	35.0	233	0.006	0.0000	-	0.1513	A + C + D +H	1.554	**0.1545**	0.98	0.81	219	1.14	1.77	***OK***
SMH4037322 to SMH4037328	5	375	4.15	4.00	9.0	60	0.006	0.0933	E	0.2446	A+ C + D + E + H	3.243	**0.3223**	0.76	0.65	343	1.10	3.56	***OK***

note 1: 10% reduction of flow area is allowed for effect of deposition of sediment

Appendix D

Detailed Information of Catchment Plan

CATCHMENT	PAVED AREA (m2)	UNPAVED AREA (m2)	TOTAL AREA (m2)
C1	512	0	512
C2	1920	0	1920
C3	3201	356	3557
C4	1206	134	1340
C5	408	0	408
C6	272	0	272
C7	407	0	407
C8	1040	115	1155
C9	334	0	334
C10	2154	239	2393
C11	8400	0	8400
C12	1088	121	1209

The corresponding impact assessment and diversion proposal will be under a separate Drainage Impact Assessment to be submitted by KC-017 Site C1

LEGEND

- EXISTING DRAINAGE PIPE
- NEW DRAINAGE PIPE
- NEW DRAINAGE PIPE TO BE UPGRADED

JOB TITLE PROPOSED RESIDENTIAL DEVELOPMENT UNDER URA PROJECT KC-015 AT KAI TAK ROAD/ SA PO ROAD, KOWLOON CITY, KOWLOON	JOB NO. 724 DRAWN BY CHECKED BY APPROVED BY B.L.	DRAWING NO. CP-01 REVISION - SCALE DATE	DRAWING TITLE CATCHMENT PLAN

ENGINEER

SYW & ASSOCIATES LTD.
CHARTERED ENGINEERS & AUTHORIZED PERSONS
邵贤伟建筑工程师

Appendix E

Hydraulic Calculation

Upstream Manhole (U/S MH)	Downstream Manhole (D/S MH)	Length (m)	Proposed Pipe Diameter (mm)	Pipe Material	Upstream Cover Level (U/S C.L.) (mPD)	Downstream Cover Level (D/S C.L.) (mPD)	Upstream Invert Level (U/S I.L.) (mPD)	Downstream Invert Level (D/S I.L.) (mPD)	Manhole Type	Gradient	Pipe Area (m2)	Perimeter (m)	R=A/P (m)	Friction factor f	Friction gradient Sf	Velocity at Full Bore (m/s)	Tf (mins)	Te (mins)	Tc (mins)	Intensity (mm/h)	Catchment	Drained Area (m2) - Paved	Drained Area (m2) - Unpaved	Runoff coefficient - Paved	Runoff coefficient - Unpaved	Accum Q (l/s)	Capacity (l/s)	Percent of Flow to Pipe Capacity
STMH-01	SMH4037343	6	450	PE Pipe	6.2	6.05	4.59	4.53	Type T1	0.0100000	0.16	1.41	0.11	0.02	0.01	2.76	0.15	5.15	5.30	301.81	C3, C4, C5	4815	490	0.9	0.3	375.63	439.52	85.46
SMH4037343	SMH4037588	26.8	450	PE Pipe	6.05	6.01	4.53	4.15	D1	0.0141791	0.16	1.41	0.11	0.02	0.02	3.34	0.15	5.15	5.30	301.82		0	0	0.9	0.3	375.63	530.41	70.82
SMH4037588	SMH102	13	600	PE Pipe	6.01	5.99	3.94	3.862	D1	0.0060000	0.28	1.88	0.15	0.02	0.01	2.52	0.10	5.10	5.20	303.05	C2	1920	0	0.9	0.3	521.09	711.49	73.24
SMH102	SMH4037344	13.8	600	Concrete	5.99	5.97	3.862	3.78	E1	0.0059420	0.28	1.88	0.15	0.02	0.01	2.16	0.10	5.10	5.20	303.07	C1	512	0	0.9	0.3	559.88	610.04	91.78
SMH4037344	SMH201	20.2	600	Concrete	5.97	6.06	3.78	3.44	E1	0.0168317	0.28	1.88	0.15	0.01	0.02	3.66	0.09	5.09	5.17	303.41	C6	272	0	0.9	0.3	580.51	1035.49	56.06
SMH201	SMH202	34.4	600	Concrete	6.06	6.15	3.44	2.86	E1	0.0168605	0.28	1.88	0.15	0.01	0.02	3.67	0.15	5.15	5.29	301.90	C7, C8	1447	115	0.9	0.3	692.62	1036.38	66.83
SMH202	SMH203	37	750	Concrete	6.15	6.23	2.86	2.49	I	0.0100000	0.44	2.36	0.19	0.01	0.01	3.22	0.19	5.19	5.38	300.77	C9, C10	2488	239	0.9	0.3	885.68	1424.29	62.18
SMH203	SMH204	22	1050	Concrete	6.23	6.3	2.35	2.26	I	0.0040909	0.87	3.30	0.26	0.01	0.00	2.51	0.13	5.13	5.27	302.18	C11, C12	9488	121	0.9	0.3	1605.49	2176.58	73.76
SMH204	SMH205	3.7	1050	Concrete	6.3	6.4	2.26	2.24	I	0.0054054	0.87	3.30	0.26	0.01	0.01	2.90	0.02	5.02	5.04	305.11		0	0	0.9	0.3	1605.49	2507.75	64.02
SMH205	SMH4037363	3.8	1050	Concrete	6.4	6.42	2.24	2.22	I	0.0052632	0.87	3.30	0.26	0.01	0.01	2.86	0.02	5.02	5.04	305.09		0	0	0.9	0.3	1605.49	2474.02	64.89

Pipe Roughness (Ks) from SDM Table 14	
Concrete	0.15
PE	0.006

Climate Change for End 21st Century =+16%
Design Allowance (End 21st Century =+12.1%
Total = 28.1%

Storm constant	
Return period T (year)	50
a	505.5
b	3.29
c	0.355

$$\bar{V} = -\sqrt{32gRS_f}\,\log_{10}\left[\frac{k_s}{14.8R} + \frac{1.255\nu}{R\sqrt{32gRS_f}}\right]$$

IDF relationship (SDM):

$$i(t,T) = \frac{a}{(t+b)^c}$$

pipe flow capacity:

$$Q = V \times A$$